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Richland Operations Office  
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0072687

APR 13 2007

07-AMCP-0160

Mr. Ken Niles, Assistant Director  
Nuclear Safety Division  
Oregon Department of Energy  
625 Marion Street Northeast, Suite 1  
Salem, Oregon 97301

RECEIVED  
APR 17 2007  
EDMC

Dear Mr. Niles:

REVIEW OF THE REMEDIAL INVESTIGATION REPORT FOR THE PLUTONIUM/  
ORGANIC-RICH PROCESS CONDENSATE/PROCESS WASTE GROUP OPERABLE  
UNIT: INCLUDES THE 200-PW-1, 200-PW-3, AND 200-PW-6 OPERABLE UNITS,  
DOE/RL-2006-51, DRAFT A

The purpose of this letter is to respond to the December 14, 2006, comments received on the Remedial Investigation Report for the Plutonium/Organic-Rich Process Condensate/Process Waste Group Operable Unit: Includes the 200-PW-1, 200-PW-3, and 200-PW-6 Operable Units, DOE/RL-2006-51, Draft A. The U.S. Department of Energy, Richland Operations Office has reviewed your comments and is providing the attached comment responses.

If you have any questions, please contact me, or your staff may contact, Briant Charboneau, of my staff, on (509) 373-6137.

Sincerely,

  
Matthew S. McCormick, Assistant Manager  
for the Central Plateau

AMCP:ACT

Attachment

cc: See Page 2

Mr. Ken Niles  
07-AMCP-0160

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cc w/attach:

G. Bohnee, NPT

N. Ceto, EPA

D. A. Faulk, EPA

S. Harris, CTUIR

J. A. Hedges, Ecology

R. Jim, YN

R. E. Piippo, FHI

J. B. Price, Ecology

J. G. Vance, FFS

~~Administrative Record~~ (200-PW-1, 200-PW-3, 200-PW-6)

Environmental Portal

cc w/o attach:

B. A. Austin, FHI

B. H. Ford, FHI

A. F. Shattuck, FFS

**Oregon Comments on Remedial Investigation Report for the Plutonium/Organic-Rich Process Condensate/Process Waste Group Operable Units: Includes the 200-PW-1, 200-PW-3, and 200-PW-6 Operable Units, DOE/RL-2006-51, Draft A**

#	Comment	Response
1.	<p>Section 1.2.1, 1.2.2, 1.2.3 and 1.2.4 notes that determination of the contaminants of potential concern (COPCs), the Human-Health Risk Evaluation, the Modeling Approach and the Ecological Risk Evaluation Methodology are all deferred to the Feasibility Study (FS). We believe this approach overlooks the stated purpose of the remedial investigation which is to collect, develop and evaluate sufficient information to define site risks and evaluate cleanup alternatives.</p>	<p>Critical aspects of the remedial investigation of the 200-PW-1 OU (e.g., DNAPL investigation in the vicinity of representative site 216-Z-9 Trench and characterization during drilling of the slant well under the 216-Z-9 Trench) were being conducted in FY2006. Although the data from these activities would be available for inclusion in the RI report (TPA Milestone M-015-45A, due October 31, 2006), the data would not be available in time to support completing the risk assessment in the RI report. The risk assessment would be incomplete without the DNAPL investigation and Z-9 slant well characterization results. Therefore, the DOE-RL and EPA project managers agreed that the risk assessment would be included in the FS (TPA Milestone M-015-45B, due September 30, 2007) rather than the RI report. The project managers agreed that moving the risk assessment from the RI report to the FS would have no impact on the outcome of the RI/FS process.</p>
2	<p>Our general impression is that even in the absence of detailed analysis, the RI substantially underestimates the risks and hazards presented by these waste sites. The contaminant screening evaluation for human health and ecological receptors should follow a "risk-based" approach as prescribed in EPA's Risk Assessment Guidance for Superfund (RAGS). The RI concludes with a series of recommendations for alternative actions to be evaluated in the FS. The concentrations and magnitude of subsurface contamination taken together with the rapid movement of the wastes to depth raises serious questions about the adequacy of our understanding of the mechanisms involved in the fate and transport of plutonium and other contaminants.</p>	<p>The risks and hazards presented by these waste sites will be evaluated for human health and ecological receptors in accordance with EPA guidance in the risk assessment that will be included in the FS report. Based on the data collected during the remedial investigation, the analysis of remedial alternatives will need to be conducted for the waste sites.</p>
3.	<p>This RI clearly notes the subsurface geology, the importance of lateral and vertical preferential transport, and the existence of subsurface ancestral channels that serve to redirect movement of water and wastes. The precise location of these features, and the subsurface clastic dikes, river bottom features and other structures</p>	<p>The RI has tried to balance the need to characterize fine-grained layers, clastic dikes, and other subsurface features that may have influenced the subsurface movement of the liquid wastes with the amount of data available to make remedial decisions. As documented in the RI report, significant effort to characterize these</p>

may have large impacts on the transport and ultimate fate of these contaminants. These ideas are not adequately reflected in the simplified conceptual models used for each waste site.

The simplified conceptual models portray lateral transport in a way that can easily be misinterpreted to be spreading or ponding on subsurface boundaries between soil layers. Though this is possible, it is equally likely that the dip of the subsurface promotes preferential transport on these layers.

This difference is important both for understanding the potential fate of the contaminants and the risks posed, as well as how the numerical modeling evaluates this movement and these risks. For example, the mechanisms involved in transporting the plutonium, americium and other contaminants clearly do not fit within the simplified conceptual framework used in the numerical models. Therefore we recommend the analysis be modified to properly and fully assess risks. This will require the major factors and forces involved in the fate and transport of the contaminants to be fully assessed and quantified before incorporation into the numerical models, which should be completed before beginning the FS.

We are concerned that preferential lateral transport on fine layers and vertical transport on clastic dikes, wells and other features will move the contaminants farther a field, may do so rapidly, and may completely bypass large portions of the soil column. This could drastically reduce contaminant transit time to groundwater and increase their concentrations.

The problem for waste sites is made even more complex by the immense amount of carbon tetrachloride solvent disposed to these sites and the chemicals co-disposed with the solvent; tributyl phosphate and its degradation products. These were used in the processes at Hanford to carry and separate plutonium from uranium and fission products. It should not then be surprising that they serve the same function in the subsurface – mobilizing plutonium to great depths.

subsurface features included cross-well seismic reflection investigations that were used to guide subsequent subsurface soil sampling. This work showed that the subsurface topography of various layers is complex on a detailed scale which had more influence on liquid waste migration (along with the heterogeneity of fine grained layers) than the overall dip of the layers. The conceptual site models presented in the Draft A RI will be revised to incorporate all existing information and the heterogeneity of the subsurface on the transport of contaminants as well as the complex subsurface topography of various layers will be noted.

The numerical modeling summarized in RI report section 2.4.3.1 only evaluated carbon tetrachloride. The findings from this modeling were substantiated by the vadose zone borings at the 216-Z-9 Trench. Contaminant fate and transport modeling to support development of remedial alternatives that mitigate the risk pathways will be addressed in the FS report.

It is clear that the organic solvents aided the mobility of plutonium in the subsurface as noted on Figure 3-10.

4	<p>The RI should extensively review the chemistry of the contaminants and their interactions to allow for a good understanding of the fate and transport of these contaminants. This review must include a thorough understanding of plutonium complex formation (such as plutonyl carbonates), colloid formation and stability, and solvated plutonium interaction with soils at a minimum.</p> <p>The previous conceptual model for plutonium, americium and neptunium movement through Hanford soils assigned these an enormous <math>K_d</math> of 200. If this were actually representative of the binding that plutonium has with Hanford soils, there would be no plutonium deeper than a few feet in the soil.</p>	<p>It is clear that the organic solvents aided the mobility of plutonium in the subsurface at 200-PW-1 OU waste sites such as the 216-Z-9 Trench, as noted on Figure 3-10. The RI focused on collecting data on the current nature and extent of subsurface contamination to guide remedial decision making.</p> <p>In the absence of organic solvents (e.g., at the 200-PW-6 OU waste sites), previous studies have shown that plutonium mobility in the subsurface is limited.</p> <p>Factors affecting the future mobility and fate of plutonium will be evaluated and considered as they relate to the remedy alternatives as they are developed in the feasibility study.</p>
5.	<p>The RI has more information and investigation on fate and extent of contaminant movement than previous reports. It does not, however, capture the full extent of fate and transport. For example: the report notes in its conclusions that the source of contamination for Crib A-8 at depth is not known.</p> <p>The analyses presented show high levels of the contaminants at the lateral and vertical extents investigated. The levels of several contaminants remain high at the furthest depths and extents investigated. Without knowing the full extent of movement it is not possible to describe the extent of the problem or to evaluate the reasonable range of potential solutions. The investigation (and or remediation) needs to go farther to determine how deep and how far these materials have moved, and should continue until the contaminant concentrations and plume boundaries are well defined.</p>	<p>For the waste sites in these operable units, the approved DQO process identified the boundaries of the RI investigation to be the vadose zone beneath the representative waste sites and the degree of detail required for a feasibility study-level alternatives analysis. Contaminants that have entered the groundwater will be addressed by the appropriate groundwater operable unit FS (e.g. 200-ZP-1 or 200-PO-1). Additional sampling may be conducted post-ROD to support the design of the remedial alternative(s); this sampling will address the extent of contamination relative to the degree of detail required for the design and implementation of the remedies.</p> <p>The uncertainty in the source of intermittent traces of Cs-137 contamination detected between 74 and 76.5 m (243 and 251 ft) depth by geophysical logging in wells near the 216-A-8 Crib is discussed in RI section 3.2.5.1. Although the source is uncertain the text indicates the contamination may have been deposited on the casing from contaminated groundwater when water levels were higher in the past.</p>
6.	<p>The RI inappropriately and incorrectly uses surface background values for comparison. The appropriate background values for anthropogenic radionuclides (Co-60, Pu-all isotopes, Cs-134, Cs-137, Sr-90, Am-241, Sb-125, Np-237 and Tc-99) at depth is zero. As we have previously commented, if the background source of</p>	<p>The document referenced (DOE/RL-96-12, Hanford Site Background: Part 2, Soil Background for Radionuclides) includes soil background values for both anthropogenic and naturally occurring radionuclides. Background values for subsurface soils are only reported for the naturally occurring radionuclides K-40,</p>

	<p>these contaminants are past practices that emitted them to the air – such as atmospheric weapon tests – then they would be restricted to the upper few inches of the soil and would not have been transported deeply into the vadose zone based on existing conceptual site models.</p>	<p>Ra-226, Th-232, U-234, U-235, and U-238. The anthropogenic radionuclide background values were only calculated on the surface soil data set. The anthropogenic radionuclides are considered long-lived radionuclides (i.e., half-lives greater than 1 year) that remain from weapons fallout. Although radionuclides deposited from global fallout are generally restricted to the upper parts of the soil where they were deposited, isotopes of more mobile elements could have migrated deeper along with surface water that had previously been exposed to fallout from atmospheric testing and was then subsequently introduced into the subsurface.</p> <p>The RI report text will be changed to indicate that anthropogenic radionuclide background levels in subsurface soils have not been determined and that only the background values for naturally occurring radionuclides in subsurface soils were used to screen the RI results.</p>
7.	<p>In accordance with EPA guidance, the FS must have a bias toward action, including removal of these contaminants from the subsurface, whether through excavation or other means.</p> <p>Additionally, extensive work at Hanford has shown lateral flow of water in thin layers in the subsurface. This can bring surface water into waste from significant distances. Simple surface caps and barriers will likely have no impact on such movement and hence cannot be relied on to limit the continuing movement of the contaminants in the subsurface.</p> <p>For the most important contaminants, monitored natural attenuation is inappropriate, as these contaminants are so long-lived that there is effectively no loss of the contaminants in any reasonable time frame.</p>	<p>The FS report will evaluate remedial alternatives for these waste sites in accordance with EPA guidance.</p> <p>The extensive work at Hanford has shown that perched water on subsurface layers has typically been found only in near proximity to active liquid waste disposal sites. A specific review of perched water in the 200 West Area was conducted as part of the RI during the DNAPL source term investigation. All of the wells where perched water was documented were drilled prior to 1995 when non-permitted waste water disposal at Hanford ended (see Appendix H, DOE/RL-2006-58, Carbon Tetrachloride Dense Non-Aqueous Phase Liquid (DNAPL) Source Term Interim Characterization Report). The vadose zone soil moisture conditions are significantly different today from what they were during the liquid waste disposal period (see RI section 3.3).</p>